

# Determining Wet Floor Safety

## Pendulum Skid Test for Sustainable Slip Resistance

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**When a slip-and-fall accident victim claims damages due to a fall on a slippery floor — such as a wet pool deck, locker room floor, or tiled outdoor plaza — often the building service organization is named as a defendant.**

The question then arises as to whether the floor (a) was slippery when originally specified, and therefore unfit for its planned use; (b) was improperly maintained; or (c) became slippery from normal wear and tear.

If building management can be confident that new flooring will sustain its slip resistance for a period of years, it can protect a considerable investment in the flooring and prevent business interruptions as well as protect the safety of the pedestrian. The stakes are even higher for hotels and cruise ships, which are occu-

piated virtually nonstop with guests who will not tolerate the noise involved in changing out hard flooring.

Sustainable Slip Resistance (SSR) testing has been developed to identify flooring that is not highly susceptible to losing its slip resistance from wear or some types of inappropriate maintenance. This test and appropriate selection criteria can help avoid investment in inappropriate flooring, as well as prevent costly, life-altering accidents.

### Test Methods and Safety Criteria

Germany and Australia for over 10 years have had detailed flooring slip resistance standards based on some 150 specific situations — e.g. external walkways, swimming pool decks, swimming pool stairs into the water, commercial

kitchens, hospital operating rooms, etc. Many architects elsewhere in Europe have informally adopted them.

The slip resistance ratings are based on humans walking on an oily or water-wet flooring sample in standard footwear and/or bare feet on a laboratory variable-angle ramp. However, the test results generally apply only to flooring before it's installed. In some cases initially good wet slip resistance is gone after the floor has been down for only a few weeks.

What's more, the ramp test can't conveniently be used to assess safety of the flooring on site after installation or after a fall has occurred.

The United Kingdom since 1971 has had well-established slip resistance standards based on a portable test method, the "British" pendulum skid tester. This

test was developed for pedestrian traction by the U.S. National Bureau of Standards in the 1940s and further refined in the UK.

It was validated for pedestrian traction in 1971, together with its safety standards, by the Greater London Council and tested in the UK over a period of 25 years by 3500 real-world public walking area tests and site accident records. The test is an ASTM standard (E 303), slightly modified for pedestrian traction.

The pendulum skid tester is now a standard test method for pedestrian slip resistance in 49 nations (European Committee for Standardization EN 13036-4, 2003 names many of them) on four continents and has been endorsed by Ceramic Tile Institute of America since 2001.

The SSR test procedure consists of an initial wet pendulum test; abrasion, wet, for up to several thousand cycles with a standard (3" x 3" 3M green) abrasive pad under a standard load of 1 kg (2.2 pounds) at 50 cycles per minute; and another wet pendulum test after abrasion. Both hard and soft rubber pendulum sliders (or "test feet") might

be used if the area is walked on in both hard-bottom footwear and bare feet or soft-soled footwear.

Typically, about 85 percent of the loss in slip resistance after 5000 cycles has already occurred after 500 cycles. Depending on the flooring buyer's situation, the flooring might be considered to have Sustainable Slip Resistance for a level floor if, for example, the wet Pendulum Test Value (PTV) is 35 or higher after abrasion for 500 cycles.

The 500-cycle result in the laboratory has been found by in situ pendulum tests to be roughly equivalent to 12–24 months of wear in customer areas at a busy McDonald's restaurant. McDonalds adopted the 500-cycle specification, minimum PTV of 35, in October 2006.

In some cases, analogous to the variable-angle ramp test-related standards mentioned above, the SSR safety standards are situation-specific rather than "one size fits all." Thus a minimum pre-abrasion wet PTV of 35 (hard or soft slider) might be required for hotel or hospital bathroom floors; a minimum of 45 (hard rubber slider) for stair nosings that

get wet in use; and 54 (hard slider) for commercial kitchens and steep outdoor ramps.

For areas that normally remain dry, a minimum wet PTV of 12 or higher might be specified to allow for dust and tracked-in grease. If the flooring is to be sealed after installation, the laboratory tests must be conducted with the correct sealer properly applied.

Experience has shown that what is specified and ordered is not always what is delivered, and it's prudent for building owners to verify that flooring meets their slip resistance specification both before installation and at turnover of the property for occupancy.

For a busy floor, monitoring of dry and wet slip resistance every 3 to 12 months after that can further protect owners, service providers, and other duty holders as well as guests and employees. □

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